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Floret-shaped solid domains on giant fluid lipid vesicles induced by pH[1] STAVROULA SOFOU, AMEY BANDEKAR, Rutgers University — Lateral lipid phase separation and domain formation induced by changes in pH is significant in liposome-based drug delivery: environmentally responsive lipid heterogeneities can be tuned to alter collective membrane properties such as drug release and drug carrier reactivity impacting, therefore, the therapeutic outcomes. At the micron-meter scale, fluorescence microscopy on Giant Unilamellar fluid Vesicles (GUVs) shows that lowering pH (from 7.0 to 5.0) promotes the condensation of titratable PS or PA lipids into beautiful floret-shaped solid domains in which lipids are tightly packed via H-bonding and VdWs interactions. Solid domains phenomenologically comprise a circular "core" cap beyond which interfacial instabilities emerge resembling leaf-like stripes of almost vanishing Gaussian curvature independent of GUVs' preparation path and in agreement with a general condensation mechanism. Increasing *incompressibility* of domains is strongly correlated with larger *number of thinner stripes* per domain, and increasing *relative rigidity* of domains with smaller *core cap areas*. Line tension drives domain ripening, however the final domain shape is a result of enhanced incompressibility and rigidity maximized by domain coupling across the bilayer. Introduction of a transmembrane osmotic gradient (hyperosmotic on the outer lipid leaflet) allows the domain condensation process to reach its maximum extent which, however, is limited by the minimal expansivity of the continuous fluid membrane.

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